

ABB Drives

**Installation and  
Start-up Guide**

FLN Adapter Module  
NFLN-01





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NFLN-01

**Installation and  
Start-up Guide**

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# Safety Instructions

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## Overview

This chapter states the safety instructions that must be followed when installing and operating the NFLN-01 FLN Adapter Module. The material in this chapter must be studied before attempting any work on, or with, the unit.

## Warnings and Notes

This manual distinguishes two sorts of safety instructions. Warnings are used to inform of conditions which can, if proper steps are not taken, lead to a serious fault condition, physical injury and death. Notes are used when the reader is required to pay special attention or when there is additional information available on the subject. Notes are less crucial than Warnings, but should not be disregarded.

### Warnings

Readers are informed of situations that can result in serious physical injury and/or serious damage to equipment with the following symbols:



**Dangerous Voltage Warning:** warns of situations in which a high voltage can cause physical injury and/or damage equipment. The text next to this symbol describes ways to avoid the danger.



**General Warning:** warns of situations which can cause physical injury and/or damage equipment by means other than electrical. The text next to this symbol describes ways to avoid the danger.



**Electrostatic Discharge Warning:** warns of situations in which an electrostatic discharge can damage equipment. The text next to this symbol describes ways to avoid the danger.

### Notes

Readers are notified of the need for special attention or additional information available on the subject with the following symbols:

#### CAUTION!

**Caution** aims to draw special attention to a particular issue.

#### Note:

**Note** gives additional information or points out more information available on the subject.

**General Safety Instructions**



**WARNING!** All electrical installation and maintenance work on the drive should be carried out by qualified electricians.

The drive and adjoining equipment must be properly earthed.

Do not attempt any work on a powered drive. After switching off the mains, always allow the intermediate circuit capacitors 5 minutes to discharge before working on the frequency converter, the motor or the motor cable. It is good practice to check (with a voltage indicating instrument) that the drive is in fact discharged before beginning work.

The motor cable terminals of the drive are at a dangerously high voltage when mains power is applied, regardless of motor operation.

There can be dangerous voltages inside the drive from external control circuits even when the drive mains power is shut off. Exercise appropriate care when working with the unit. Neglecting these instructions can cause physical injury and death.



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**WARNING!** There are several automatic reset functions in the drive. If selected, they reset the unit and resume operation after a fault. These functions should not be selected if other equipment is not compatible with this kind of operation, or dangerous situations can be caused by such action.

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More Warnings and Notes are printed at appropriate instances along the text.

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# Chapter 1 – Introduction to This Guide

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## **Overview**

This chapter contains a description of the *Start-up and Installation Guide* for the NFLN-01 FLN Adapter Module.

## **Intended Audience**

The Guide is intended for the people who are responsible for installing, commissioning and using a FLN Adapter Module with an ABB drive. The reader is expected to have a basic knowledge of electrical fundamentals, electrical wiring practices, the drive, the use of the drive control panel, and the FLN protocol.

## **What This Guide Contains**

The installation and start-up of the NFLN-01 FLN Adapter Module are introduced in this Guide.

It is assumed that the drive is installed and ready to operate before starting the installation of the adapter module. For more information on the installation and start-up procedures of the drive, please refer to its user documentation.

**Safety Instructions** are featured in the first few pages of this Guide. Safety Instructions describe the formats for various warnings and notations used within this Guide. This chapter also states the safety instructions which apply to the installation and operation of the NFLN-01 Module.

**Chapter 1 – Introduction to This Guide** contains a short description of the Guide.

**Chapter 2 – Overview** contains a short description of the FLN protocol and the NFLN-01 FLN Adapter Module, a delivery checklist, and information on the manufacturer's warranty.

**Chapter 3 – Mechanical Installation** contains placing and mounting instructions for the module.

**Chapter 4 – Electrical Installation** contains wiring, bus termination and earthing instructions.

**Chapter 5 – Programming** explains how to program the master station and the drive before the communication through the adapter module can be started.

**Chapter 6 – Fault Tracing** explains how to trace faults with the Status LEDs on the NFLN-01 Module.

**Appendix A** presents the FLN Points in supported ABB drives.

**Appendix B** contains Technical Data.

**Appendix C** contains a installation check-list.

**Appendix D** contains a specification of the ambient conditions allowed during transportation, storage and use of the NFLN-01.

## **Conventions Used in This Guide**

<i>Parameter</i>	A parameter is an operating instruction for the drive. Parameters can be read and programmed with the drive control panel.
<i>Point</i>	A point is an actual value or operating instruction for the drive, which can be read and programmed from the FLN LAN through the NFLN-01 Module.
<i>Communication Module</i>	Communication Module is a parameter name/parameter selection name for a device (e.g. a fieldbus adapter) through which the drive is connected to an external serial communication network (e.g. a fieldbus). The communication with the communication module is activated with a drive parameter.
<i>NFLN-01 FLN Adapter Module</i>	The NFLN-01 Adapter Module is one of the optional fieldbus adapter modules available for ABB drives. The NFLN-01 is a device through which an ABB drive is connected to a FLN serial communication bus.
<i>LAN</i>	Local Area Network

# Chapter 2 – Overview

**Overview**

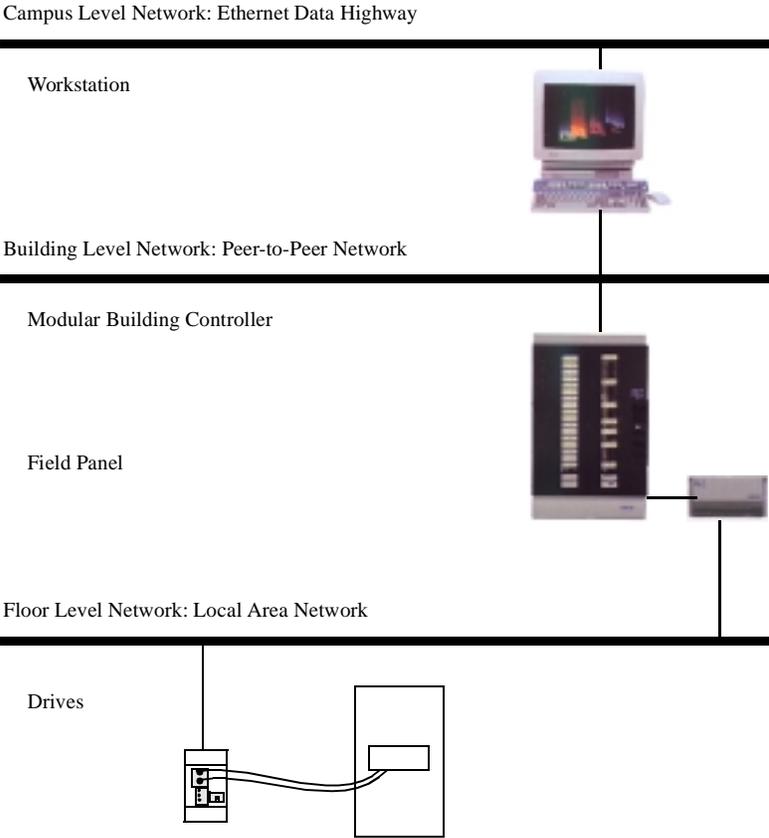
This chapter contains a short description of the FLN protocol and the NFLN-01 Adapter Module, a delivery checklist, and warranty information.

**FLN** The FLN LAN protocol is a master – slave type serial communication protocol used by the Landis & Staefa System 600 system.

In the System 600 architecture the FLN LAN connects controllers (like ACS 600 drives) to field panels.

**System 600 Overview**

System 600 has three levels of communication networks. FLN LAN is used as a Local Area Network on Floor level. A simplified overview of the architecture is shown in *Figure:2-1 'System 600 Architecture'*.



*Figure:2-1 System 600 Architecture*

On the FLN LAN network each ABB drive can be accessed by the full complement of System 600 features, including English and SI units, point data-base inside the drive, and full scaling.

ABB drives have a pre-defined set of Analog and Digital I/O points. A complete list of these points is in 'Appendix A - FLN Points' of this manual.

On one FLN LAN segment there can be a maximum of 32 FLN devices.

**Application** The System 600 unique application identification number for ACS 600 drives is 2707 and ACH 400 drives is 2708. This is used to identify the list of points for the drive in the system.

## The NFLN-01 FLN Adapter Module

The NFLN-01 FLN Adapter Module is an optional device for ABB drives which enables the connection of the drive to a FLN system. The drive is considered as a slave in the FLN network. Through the NFLN-01 FLN Adapter Module it is possible to:

- Give control commands to the drive (Start, Stop, Run enable, etc.)
- Feed a motor speed reference to the drive
- Give a process reference to the PID controller of the drive
- Read status information and actual values from the drive
- Change some of drive parameter values
- Reset a drive fault.

The FLN commands and services supported by the NFLN-01 FLN Adapter Module are discussed in Chapter 6. Please refer to the user documentation of the drive as to which commands are supported by the drive.

The adapter module is mounted onto a standard mounting rail inside or outside the drive unit, depending on drive type and configuration. See the user's manual of the drive for module placement options.

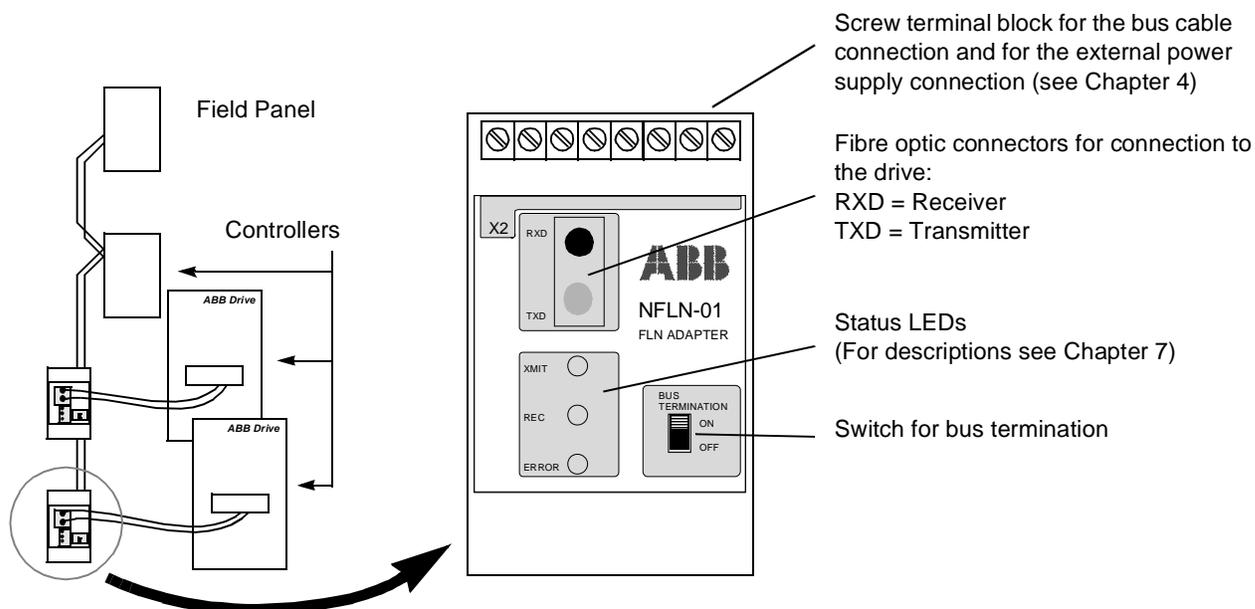


Figure 2-2 The construction of the FLN link and the NFLN-01 Adapter Module.

**Compatibility** The NFLN-01 is compatible with (see also Chapter 5, Parameter no. 8 *COMM PROFILE*):

- ACS 600 SingleDrive
- ACS 600 MultiDrive
- ACS 400

**Delivery Check** The option package for the NFLN-01 FLN Adapter Module contains:

- FLN Adapter Module, Type NFLN-01
- Two pairs (four pieces) of fibre optic cables for connecting the adapter to the drive
- Mounting rail
- This manual, the *Installation and Start-up Guide for NFLN-01*.

**Warranty and Liability Information**

The warranty for your ABB drive and options covers manufacturing defects. The manufacturer carries no responsibility for damage due to transport or unpacking.

In no event and under no circumstances shall the manufacturer be liable for damages and failures due to misuse, abuse, improper installation, or abnormal conditions of temperature, dust, or corrosives, or failures due to operation above rated capacities. Nor shall the manufacturer ever be liable for consequential and incidental damages.

The period of manufacturer's warranty is 12 months, and not more than 18 months, from the date of delivery.

Extended warranty may be available with certified start-up. Contact your local distributor for details.

Your local ABB Drives company or distributor may have a different warranty period, which is specified in their sales terms, conditions, and warranty terms.

If you have any questions concerning your ABB drive, contact your local distributor or ABB Drives office.

The technical data and specifications are valid at the time of printing. ABB reserves the right to subsequent alterations.

## Chapter 3 – Mechanical Installation

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### Overview

This chapter contains module mounting instructions. Depending on the drive, the module can be installed either inside or outside the drive housing or cabinet. See the user's manual of the drive for module placement options.

### Mounting Outside the Drive

Choose the location for the module. Note the following:

- The cabling instructions must be followed (see Chapter 4). Also, the length of the fibre optic cables included in the option package restrict the distance between the module and the drive.
- Observe the free space requirements for the module (min. 10 mm from adjoining equipment or wall) and the drive (see the drive documentation).
- The ambient conditions should be taken into account (see Appendix C). The degree of protection of the module is IP 20.
- The module ground is connected to the mounting rail by means of a grounding clip (see Figure 3-1 below). The mounting rail onto which the option module is to be mounted must be grounded to a noiseless ground. If the rail is not mounted on a properly grounded base, a separate grounding conductor must be used. The conductor must be as short as possible and the cross-sectional area must be 6 mm<sup>2</sup> at least. **Note:** No solid copper conductor may be used (stranded wire allowed only).

Mounting instructions:

1. Switch off all dangerous voltages in the enclosure that the module is to be mounted in.
2. Fasten the rail and ensure the proper grounding as described above.
3. Push the module onto the rail. The module can be released by pulling the locking spring with a screwdriver (see Figure 3-1).

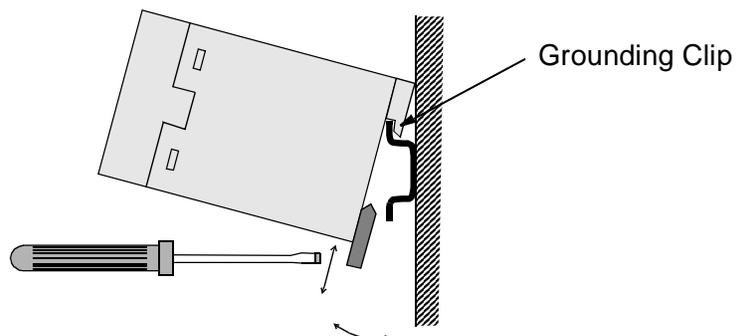


Figure 3-1 Mounting and removing the module.

### Mounting Inside the Drive

The work inside the drive should be carried out by a qualified electrician only.



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**WARNING!** Pay attention to the slowly discharging voltage of the capacitor bank and the voltages that are connected from external control circuits to the inputs and outputs of the drive.

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**WARNING!** Do not touch the printed circuit boards. The integrated circuits are extremely sensitive to electrostatic discharge.

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Mounting instructions:

1. Stop the drive.
2. Switch off the power supply of the drive and all dangerous voltages connected to the inputs and outputs.
3. Wait for five minutes to ensure that the capacitors in the intermediate circuit have discharged.
4. Remove the front cover of the drive.
5. Ensure that the line power cable, motor cable and capacitor bank (UDC+ and UDC-) are not powered.
6. Locate the position for the module (see the user's manual of the drive). Fasten the mounting rail to its place if not already installed. Observe the free space requirements for the module (min. 10 mm from adjoining equipment/wall).
7. Push the module onto the rail. The module can be released by pulling the locking spring with a screwdriver (see Figure 3-1).

# Chapter 4 – Electrical Installation

## Overview

This chapter contains:

- Cabling instructions
- Instructions for bus termination
- Connection and grounding instructions for the NFLN-01 Module and grounding instructions for the bus cable.



**WARNING!** Before installation, switch off the drive power supply. Wait for five minutes to ensure that the capacitor bank of the drive is discharged. Switch off all dangerous voltages connected from external control circuits to the inputs and outputs of the drive.

## Cabling

Arrange the bus cables as far away from the motor cables as possible. Avoid parallel runs. Use bushings at cable entries.

Handle the fiber optic cables with care. When unplugging optic cables, always grab the connector, not the cable itself. Do not touch the ends of the fibers with bare hands as the fiber is extremely sensitive to dirt.

The maximum long term tensile load for the fiber optic cable is 1 N. The minimum short term bend radius is 25 mm.

## Bus Termination

The built-in terminating resistors must be switched on if the NFLN-01 module is installed at the end of the bus. Otherwise the resistors must be switched off. Terminating resistors prevent signal reflections from the bus cable ends.

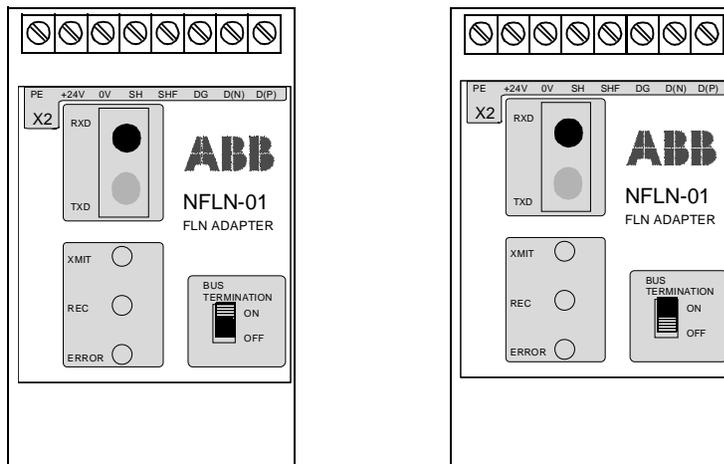
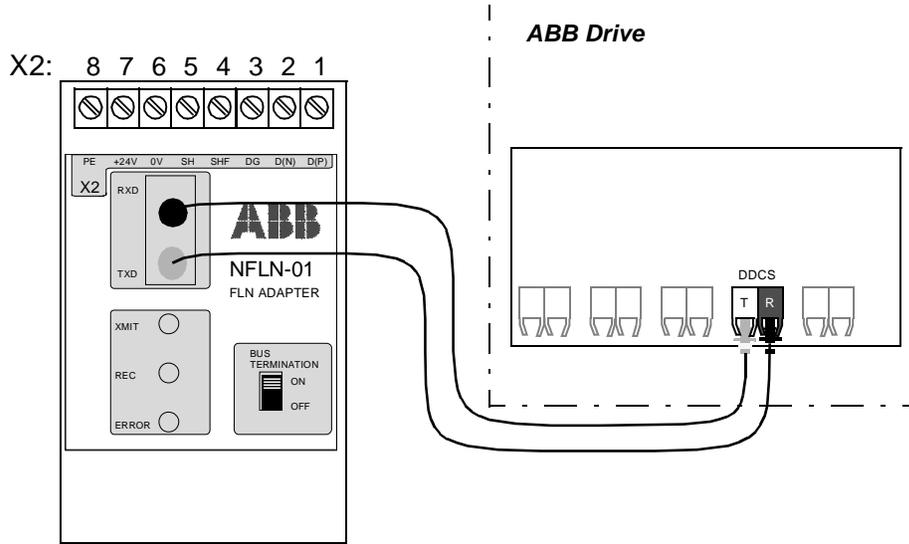


Figure 4-1 Terminating resistors on (left) and off (right).

**NFLN-01 Connections**



*Figure 4-2 Fiber optic link connecting the NFLN-01 adapter to the drive.*

The NFLN-01 module is connected to the drive using a fiber optic cable link. Consult the drive documentation as to the corresponding terminals inside the drive.

The bus cable and the external power supply are connected to terminal block X2 on the NFLN-01.

*Table 4-1 Description of terminal block X2.*

X2		Description
1	D(P)	D(P) = B = Data Positive (Conductor 1 in twisted pair) D(N) = A = Data Negative (Conductor 2 in twisted pair) DG = Data Ground
2	D(N)	
3	DG	
4	SHF	Filtered Shield (Grounded via an RC filter)
5	SH	Shield (Grounded)
6	0V	Power supply for the module (24 V d.c. ± 10 %); screened cable.
7	+24 V	
8	PE	Ground

## Grounding

The NFLN-01 module ground is connected to the rail onto which the module is mounted. If the rail is fastened to an grounded metallic assembly plate, the module is automatically grounded, and no external grounding wire is needed. If the rail is fastened to a base that is not grounded, the rail must be connected to the nearest grounding terminal. However, the grounding wire should not be connected to the same terminal as the power cable screens. (See page 3-1.)

In the NFLN-01 module there are several built-in grounding terminals (see Figure 4-3 below):

- The **PE** terminal is internally connected to the NFLN-01 module ground. Normally, no external wires need to be connected to this terminal.
- The **SH** terminal is internally connected to the NFLN-01 module ground. The SH terminal is normally used for grounding the FLN cable shield if there is no other station at which the cable shield is directly grounded.
- The **SHF** terminal is internally connected to the NFLN-01 module ground via an RC filter. The SHF terminal is typically used for grounding the FLN cable shield.
- The **DG** terminal is isolated from the NFLN-01 module ground. This terminal is used for connecting the third conductor of the bus cable. The third conductor – Data Ground – offers a common reference or comparison potential to all modules on the bus.

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**Note:** The use of Data Ground is recommended as it improves noise immunity. See diagram next page.

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**Grounding the FLN Cable Shields**

The FLN cable shield may be directly grounded at one station only. At other stations the cable shield should be grounded via an RC filter.

In the example in Figure 4-3 below, the direct ground connection is made through a metallic housing in which one NFLN-01 Module is installed. At the other stations, the bus cable screens are twisted into short pigtailed and connected to ground through RC filters.

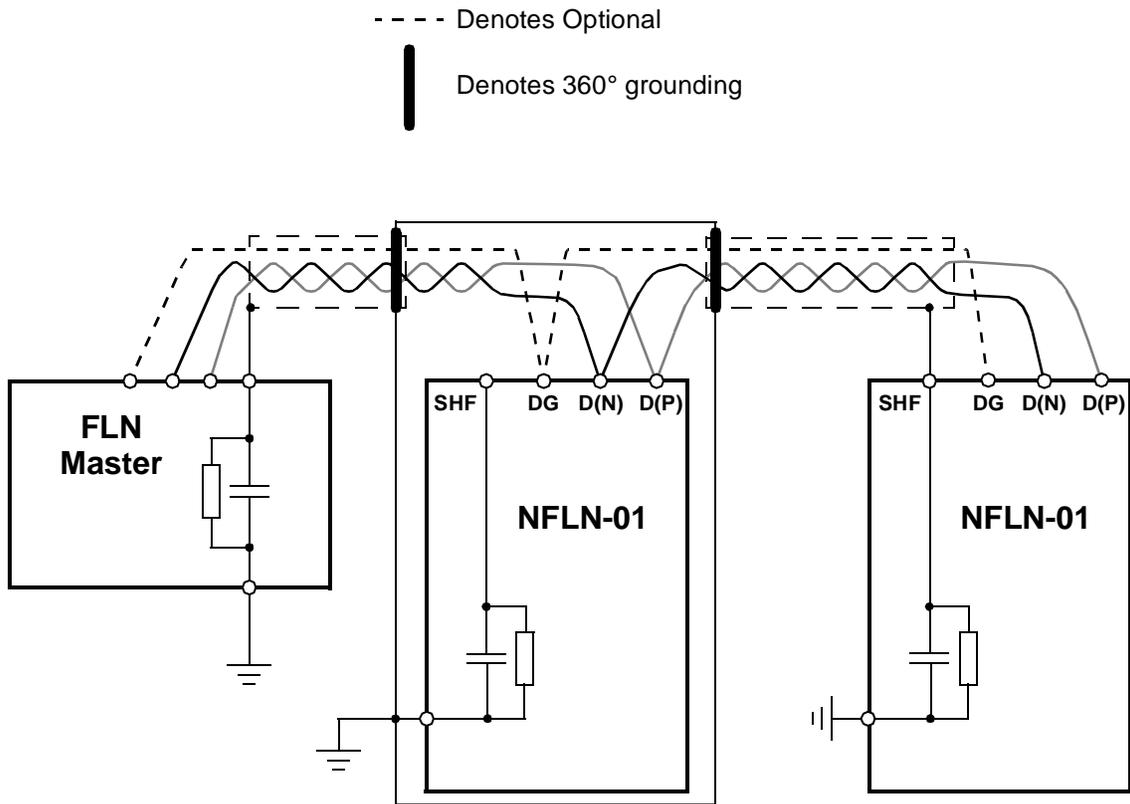


Figure 4-3 FLN cable connections.

## Chapter 5 – Programming

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### **Overview**

This chapter describes the programming of the ABB drives for the FLN LAN. The reader should be familiar with the used ABB drive and the Landis & Staefa System 600.

### **L&S / ABB Coordination**

Coordinate drive programming with the local Landis & Staefa representative so that the drive LAN address is setup correctly. L&S representative should communicate which drive control functionality will be required for each drive (control locations) so that ABB start-up personnel can setup the drives correctly for the installation.

### **Supported Features**

To the field panel, ABB drives look like a FLN LAN devices. A complete list of the points inside the supported drives are listed in 'Appendix A - FLN Points'.

### **Configuring the System**

After the NFLN-01 FLN Adapter Module has been mechanically and electrically installed according to the instructions in Chapters 3 and 4, the drive must be prepared for communication with the module.

#### **FLN Connection Configuration**

The detailed procedure of activating the module for communication with the drive is dependent on drive type. (Normally, a parameter must be adjusted to activate the communication. See the drive documentation.)

As communication between the drive and the NFLN-01 is established, several configuration parameters are copied to the drive. These parameters – shown below in Table 5-1 – must be checked first and adjusted if necessary. The alternative selections for these parameters are discussed in more detail below the table. (Note that the new settings take effect only when the module power is cycled after the change.)

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**Note:** The grouping, numbering, and adjustment procedure of parameters vary from drive to drive. See the drive documentation for information.

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Table 5-1 The NFLN-01 configuration parameters.

Fieldbus Par. No.	Parameter Name	Alternative Settings	Default Setting
1	MODULE TYPE		NFLN-01 vn.n
2	STATION NUMBER	0 to 98	1
3	BAUD RATE	(0) 1200; (1) 2400; (2) 4800; (3) 9600; (4) 19200	4800
4	COMM PROFILE	(0) ABB DRIVES; (1) CSA 2.8/3.0	ABB DRIVES
5	WATCHDOG MODE	(0) FAULT, (1) RESET	FAULT
6	GOOD MESSAGES	0 to 32767	0
7	BAD MESSAGES	0 to 32767	0

**MODULE TYPE** This parameter shows the module type as detected by the drive. The value cannot be adjusted by the user. (If this parameter is undefined, the communication between the drive and the module has not been established.)

**STATION NUMBER** Each device on the FLN LAN must have a unique station number. This parameter selects the FLN LAN address for the drive on the FLN LAN. Confirm the value with Landis & Staefa representative.

**BAUD RATE** This parameter selects the communication speed on the FLN LAN. 4800 Baud is the default value

**COMM PROFILE** This parameter selects the communication profile used in the DDCS link between the drive and the NFLN-01. The setting to use is dependent on drive type and software version as indicated below. (The drive software version can be checked by viewing a parameter; see the drive documentation.)

Drive Type	Drive SW Version	Setting to Use
ACS 600 SingleDrive	ACxA5000 or later	<b>ABB DRIVES or CSA 2.8/3.0</b>
ACS 600 SingleDrive with PFC	AHxA2000 or later	<b>CSA 2.8/3.0</b>
ACH 400		<b>ABB DRIVES</b>

**ABB DRIVES**

The Control and Status Word bits in drive are assigned as defined by the ABB Drives Profile (based on the PROFIBUS standard). For NFLN-01 this means that if the drive is controlled via FLN LAN the point 35 RUN ENABLE must be set before starting the drive, even if it has been selected to be from other source by a parameter in the drive. When drive is stopped via FLN by setting point 24 CMD STP.STRT it will always ramp to stop even different stop type has been chosen by a parameter. If stop by coast is required drive can be stopped by setting point 35 to OFF.

**CSA 2.8/3.0**

Run enable and stop type are defined by the parameter settings in drive if drive is controlled via FLN LAN.

NOTE: With ACS600 parameter 98.7 has to have same value as the COMM PROFILE in the Communication Module parameter group.

*WATCHDOG MODE* There are two selections.

**FAULT**

On a watch-dog error, the module will indicate a watch-dog error.

**RESET**

On a watch-dog error, the module will reset itself.

If the NFLN-01 can have short disconnects in its power supply, it may go to watch-dog error mode. If such happens frequently this parameter should be set to RESET.

*GOOD MESSAGES* This diagnostics counter increases by one every time a valid FLN message has been received by NFLN-01 Adapter. This counter will roll over from 32767 back to 0. During normal operation, this counter is increasing constantly.

*BAD MESSAGES* This diagnostics counter increases by one every time the NFLN-01 Adapter finds any kind of communication error. This counter will roll over from 32767 back to 0. When adding the drive application to a field panel for the first time, it is normal for this counter to increase when field panel is scanning all points from the drive and addresses also non existing points. During normal operation, this counter seldom increases.

**Control Locations**

ABB drives can receive control information from multiple sources including digital inputs, analog inputs, the drive control panel and a communication module (e.g. NFLN-01). ABB drives allow the user to separately determine the source for each type of control information (Start, Stop, Direction, Reference, Fault Reset, etc.). In order to give the fieldbus master station the most complete control over the drive, the communication module must be selected as source for this information. See the user documentation of the drive for information on the selection parameters.



## Chapter 6 – Fault Tracing

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### Overview

This chapter gives step-by-step diagnostics information for determining the root causes and corrections to the most common problems with the NFLN-01 module.

This section is divided into different sections, and every chapter lists first the symptoms, then possible causes, and remedies for them.

### Installation Problems

Verify all the connections on the module:

- Modbus cable is connected correctly to terminal block X2.
- 24 VDC power is connected to the power connectors.
- Fiber link cable is connected between drive 0 and the NFLN-01.
- Check that the fiber link connector colors match the drive and the NFLN-01 connector colours.

### Drive Setup

Communication Module Parameters not visible on the control panel.

- See the user documentation of the drive to get information how to enable the communication between module and drive.

The NFLN-01 is using default values.

- Verify that Communication Module Parameter group is setup correctly. If so, switch off and on the power to the NFLN-01, which causes the module to re-read its setup parameters.

Drive values can be read, but control commands (Start/Stop or Reference) do not work.

- Check that the control location parameters are set to COMM. MODULE for the required operation.
- Check that the drive is in REMOTE control.

**Status LEDs**

The NFLN-01 has three status LEDs. These are from top to bottom:

- Transmit LED. This LED will flash each time the NFLN-01 transmits a response or an exception on the FLN LAN.
- Receive LED. This LED will flash each time the NFLN-01 receives a command from the FLN LAN network.
- Combined error and module status LED. This LED will flash for the following reasons:
  - If the received command had a parity error.
  - If the received command had a CRC error.
  - If the received command or addressed point was not supported by the NFLN-01 MODULE. In this case the Transmit LED will also flash.
  - If the NFLN-01 module has found an error. These error codes are described below.

**Module Diagnostics**

On module power-up, the NFLN-01 goes through a power-up self-test sequence. During this, the test state is indicated by the front three LEDs.

If there is a failure, the module status LEDs remain in the state that was not passed. *Table 6-1 'NFLN-01 Error Code'* below shows the error codes.

*Table 6-1 NFLN-01 Error Code*

Flash Code	Status	Correction
Occasional flash on Error LED	Module on-line. Parity, CRC or unsupported command received.	Check the wiring and grounding of the module. Verify that only supported commands are sent to the module.
Error LED flashes continuously	NMBA is OK, no response from the drive on fiber link	Power on the drive. Check the fiber link wiring.
All LEDs flash continuously at the same time.	Watchdog time out	Hardware failure on NMBA module. Switch power off and on; if the problem persists, replace the NMBA module.
XMIT, REC, and ERROR LEDs on	ROM checksum test failed	Hardware failure. Replace NMBA.
REC and ERROR LEDs on	RAM test failed	Hardware failure. Replace NMBA.
ERROR LED on	DDCS ASIC register access test failed	Hardware failure. Replace NMBA.
Continuous reboot	Drive configuration write failed	Incorrect drive firmware. Change the downloaded drive application. Contact an ABB representative.

## Appendix A – FLN Points

The tables below shows the FLN LAN points for different ABB drives.

*Table A-1 FLN LAN points for ACS600, application 2707*

Pnt	Descriptor	Type	Engr. Units (SI Units)	Slope (SI Units)	Intercept (SI Units)	In EE-prom	Range
				On Text	Off Text		
1	CTRL ADDRESS	LAO	--	1	0	Yes	0-98
2	APPLICATION	LAO	--	1	0	--	2707
{3}	FREQ OUTPUT	LAI	HZ	0.01	0	--	0-300
{4}	PCT OUTPUT	LAI	PCT	0.005	0	--	0-100
{5}	SPEED	LAI	RPM	1	0	--	0-18000
{6}	CURRENT	LAI	A	0.1	0	--	0-3276
{7}	TORQUE	LAI	PCT	0.1	-300	--	0-300
{8}	POWER	LAI	PCT	0.1	0	--	0-300
{9}	DRIVE TEMP	LAI	DEG F (DEG C)	1.8 (1)	32 (0)	--	32-257 (0-125)
{10}	MWH	LAI	MWH	0.1	0	--	0-3676
{12}	RUN TIME	LAI	HRS	1	0	--	0-36767
{13}	DC BUS VOLT	LAI	V	1	0	--	0-1200
20	OVRD TIME	LAO	HRS	1	0	--	0-255
{21}	FWD.REV	LDI	--	REV	FWD	--	0-1
{22}	CMD FWD.REV	LDO	--	REV	FWD	--	0-1
{23}	STOP.RUN	LDI	--	RUN	STOP	--	0-1
{24}	CMD STP.STRT	LDO	--	START	STOP	--	0-1
29	DAY.NIGHT	LDO	--	NIGHT	DAY	--	0-1
30	CURRENT LIM	LAO	PCT	0.01	0	Yes	0-200
31	ACCEL TIME 1	LAO	SEC	0.1	0	Yes	0-1800
32	DECEL TIME 1	LAO	SEC	0.1	0	Yes	0-1800
33	LOCK PANEL	LDO	--	LOCK	OPEN	Yes	0-1
{34}	SEL HND.AUTO	LDO	--	AUTO	HAND	--	0-1
{35}	RUN ENABLE	LDO	--	ON	OFF	--	0-1
{40}	CMD DRV RO 1	LDO	--	ON	OFF	--	0-1
{41}	CMD DRV RO 2	LDO	--	ON	OFF	--	0-1
{42}	CMD DRV RO 3	LDO	--	ON	OFF	--	0-1
{43}	DRV ACT AO 1	LAI	MA	0.001	0	--	0-20
{44}	DRV ACT AO 2	LAI	MA	0.001	0	--	0-20
{45}	DRV ACT AI 1	LAI	V	0.001	0	--	0-10
{46}	DRV ACT AI 2	LAI	MA	0.001	0	--	0-20
{47}	DRV ACT AI 3	LAI	MA	0.001	0	--	0-20

Appendix A – FLN Points

Pnt	Descriptor	Type	Engr. Units (SI Units)	Slope (SI Units)		In EE-prom	Range
				On Text	Off Text		
{48}	CMD DRV AO 1	LAO	PCT	0.005	0	--	0-100
{49}	CMD DRV AO 2	LAO	PCT	0.005	0	--	0-100
{50}	INPUT REF 1	LAO	HZ	0.005	0	--	0-100
{51}	INPUT REF 2	LAO	PCT	0.005	0	--	0-100
{60}	PID FEEDBACK	LAI	PCT	0.01	0	--	0-100
61	PID GAIN	LAO	PCT	0.01	0.1	Yes	0.1-100
62	PID I TIME	LAO	SEC	0.01	0.02	Yes	0.02-320
63	PID D TIME	LAO	SEC	0.01	0	Yes	0-10
64	PID D FILTER	LAO	SEC	0.01	0.04	Yes	0.04-10
{70}	DRV ACT DI 1	LDI	--	ON	OFF	--	0-1
{71}	DRV ACT DI 2	LDI	--	ON	OFF	--	0-1
{72}	DRV ACT DI 3	LDI	--	ON	OFF	--	0-1
{73}	DRV ACT DI 4	LDI	--	ON	OFF	--	0-1
{74}	DRV ACT DI 5	LDI	--	ON	OFF	--	0-1
{75}	DRV ACT DI 6	LDI	--	ON	OFF	--	0-1
{76}	DRV ACT RO 1	LDI	--	ON	OFF	--	0-1
{77}	DRV ACT RO 2	LDI	--	ON	OFF	--	0-1
{78}	DRV ACT RO 3	LDI	--	ON	OFF	--	0-1
{90}	FAULT WORD 1	LAI	--	1	0	--	0-16
{91}	FAULT WORD 2	LAI	--	1	0	--	0-16
{92}	SYSTEM FAULT	LAI	--	1	0	--	0-16
{93}	OK.FAULT	LDI	--	FAULT	OK	--	0-16
{94}	RESET FAULT	LDO	--	RESET	NO	--	0-16
99	ERROR STATUS	LAI	--	1	0	--	0-255

Table A-2 FLN LAN points for ACH400, application 2708

Pnt	Descriptor	Type	Engr. Units (SI Units)	Slope (SI Units)		Intercept (SI Units)	In EE-prom	Range
				On Text	Off Text			
1	CTRL ADDRESS	LAO	--	1	0	0	Yes	0-98
2	APPLICATION	LAO	--	1	0	0	--	2708
{3}	FREQ OUTPUT	LAI	HZ	0.1	0	0	--	0-250
{4}	PCT OUTPUT	LAI	PCT	0.01	0	0	--	0-100
{5}	SPEED	LAI	RPM	1	0	0	--	0-9999
{6}	CURRENT	LAI	A	0.1	0	0	--	0-9999
{7}	TORQUE	LAI	PCT	0.1	-300	0	--	0-300
{8}	POWER	LAI	KW	0.1	0	0	--	0-9999
{9}	DRIVE TEMP	LAI	DEG F (DEG C)	0.18 (0.1)	32 (0)	0	--	0-302 (0-150)
{10}	KWH	LAI	KWH	1	0	0	--	0-9999
{11}	MWH	LAI	MWH	0.1	0	0	--	0-999
{12}	RUN TIME	LAI	HRS	1	0	0	--	0-9999
{13}	DC BUS VOLT	LAI	V	0.1	0	0	--	0-999
20	OVRD TIME	LAO	HRS	1	0	0	--	0-255
{21}	FWD.REV	LDI	--	REV	FWD	0	--	0-1
{22}	CMD FWD.REV	LDO	--	REV	FWD	0	--	0-1
{23}	STOP.RUN	LDI	--	RUN	STOP	0	--	0-1
{24}	CMD STP.STRT	LDO	--	START	STOP	0	--	0-1
29	DAY.NIGHT	LDO	--	NIGHT	DAY	0	--	0-1
30	CURRENT LIM	LAO	A	0.1	0	0	Yes	0.5*In- 1.66*In
31	ACCEL TIME 1	LAO	SEC	0.1	0.1	0	Yes	0.1-1800
32	DECEL TIME 1	LAO	SEC	0.1	0.1	0	Yes	0.1-1800
33	LOCK PANEL	LDO	--	LOCK	OPEN	0	Yes	0-1
{34}	SEL HND.AUTO	LDO	--	AUTO	HAND	0	--	0-1
{35}	RUN ENABLE	LDO	--	ON	OFF	0	--	0-1
{40}	CMD DRV RO 1	LDO	--	ON	OFF	0	--	0-1
{41}	CMD DRV RO 2	LDO	--	ON	OFF	0	--	0-1
{43}	DRV ACT AO 1	LAI	MA	0.1	0	0	--	0-20
{45}	DRV ACT AI 1	LAI	PCT	0.1	0	0	--	0-100
{46}	DRV ACT AI 2	LAI	PCT	0.1	0	0	--	0-100
{48}	CMD DRV AO 1	LAO	PCT	0.5	0	0	--	0-100
{50}	INPUT REF 1	LAO	PCT	0.005	0	0	--	0-100
{51}	INPUT REF 2	LAO	PCT	0.01	0	0	--	0-100
{60}	PID FEEDBACK	LAI	PCT	0.1	0	0	--	0-100
61	PID GAIN	LAO	PCT	0.1	0.1	0	Yes	0.1-100
62	PID I TIME	LAO	SEC	0.1	0.1	0	Yes	0.1-320

Appendix A – FLN Points

Pnt	Descriptor	Type	Engr. Units (SI Units)	Slope (SI Units)		Intercept (SI Units)	In EE-prom	Range
				On Text	Off Text			
63	PID D TIME	LAO	SEC	0.1	0	0	Yes	0-10
64	PID D FILTER	LAO	SEC	0.1	0	0	Yes	0-10
{70}	DRV ACT DI 1	LDI	--	ON	OFF	0	--	0-1
{71}	DRV ACT DI 2	LDI	--	ON	OFF	0	--	0-1
{72}	DRV ACT DI 3	LDI	--	ON	OFF	0	--	0-1
{73}	DRV ACT DI 4	LDI	--	ON	OFF	0	--	0-1
{74}	DRV ACT DI 5	LDI	--	ON	OFF	0	--	0-1
{76}	DRV ACT RO 1	LDI	--	ON	OFF	0	--	0-1
{77}	DRV ACT RO 2	LDI	--	ON	OFF	0	--	0-1
{90}	LAST FAULT	LAI	--	1	0	0	--	0-255
{91}	PREV FAULT	LAI	--	1	0	0	--	0-255
{92}	OLDEST FAULT	LAI	--	1	0	0	--	0-255
{93}	OK.FAULT	LDI	--	FAULT	OK	0	--	0-1
{94}	RESET FAULT	LDO	--	RESET	NO	0	--	0-1
99	ERROR STATUS	LAI	--	1	0	0	--	0-255

NOTE: To command ACH400 Analogue and Relay Outputs via FLN following settings are required:

- Relay Output 1: Set parameter 1401 to 7 “SUPERV1 OVER”, set parameter 3201 to 131 (SERIAL LINK DATA1) and set parameter 3203 to 1.
- Relay Output 2: Set parameter 1402 to 7 “SUPERV2 OVER”, set parameter 3204 to 132 (SERIAL LINK DATA 2) and set parameter 3206 to 1.
- Analogue Output: Set parameter 1501 to 133 (SERIAL LINK DATA 3) and set parameter 1503 to 255.

## Appendix B – Technical Data

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### **DDCS Link**

**Compatible Devices:** All ABB Fieldbus Adapter modules, ABB ACS 600, ACS/ACH 400 Drives

**Size of the Link:** 2 stations

**Medium:** Fiber optic cable

- Construction: Plastic core, diameter 1 mm, sheathed with plastic jacket
- Attenuation: 0.31 dB/m
- Maximum Length between Stations: 10 m
- Specifications:

Parameter	Minimum	Maximum	Unit
Storage Temperature	-55	+85	°C
Installation Temperature	-20	+70	°C
Short Term Tensile Force		50	N
Short Term Bend Radius	25		mm
Long Term Bend Radius	35		mm
Long Term Tensile Load		1	N
Flexing		1000	cycles

**Topology:** Point-to-point

**Serial Communication Type:** Synchronous, half Duplex

**Transfer Rate:** 4 Mbit/s

**Protocol:** Distributed Drives Communication System (DDCS)

**Connectors:** Blue – receiver; grey – transmitter

**Fieldbus Link**

**Compatible Devices:** All devices compatible with the FLN protocol

**Size of the Link:** 99 stations with repeaters (32 stations per segment)

**Medium:** Shielded, twisted pair RS485 cable

- Termination: built in the NFLN-01 Module

**Topology:** Multi-drop

**Serial Communication Type:** Asynchronous, half Duplex

**Transfer Rate:** 1200, 2400, 4800, 9600, or 19200 bit/s

**Protocol:** FLN

**NFLN-01**

**Enclosure:** Plastic, dimensions 45 x 75 x 105 mm; degree of protection IP 20

**Mounting:** Onto a standard mounting rail

**Settings:** Via drive interface (control panel)

**Current Consumption:** 80 mA at 24 V d.c.

**Connectors:**

- Light transmitter (grey) and receiver (blue) for connection to the drive
- One Combicon MVSTBW 2,5/8-ST-5,08 (8-pole, cross-section 2.5 mm<sup>2</sup> max.) screw terminal block for the fieldbus and power supply:

X2		Description
1	D(P)	D(P) = B = Data Positive (Conductor 1 in twisted pair) D(N) = A = Data Negative (Conductor 2 in twisted pair) DG = Data Ground
2	D(N)	
3	DG	
4	SHF	Filtered Shield (Grounded via an RC filter)
5	SH	Shield (Grounded)
6	0V	Power supply for the module (24 V d.c. ± 10 %); screened cable.
7	+24 V	
8	PE	Ground

**General:**

- All materials are UL/CSA approved
- Complies with EMC Standards EN 50081-2 and EN 50082-2



## Appendix C – Installation Check-list

This chapter has an installation check-list. Items on this list must usually be agreed for the installation. How the drive is programmed, depends on how the Landis & Staefa System 600 is controlling the drive.

*Table C-1 Check-list*

Item	Ref 1 (Hand)	Ref 2 (Auto)	Done
LAN address	<input type="checkbox"/> _ _ _ _		<input type="checkbox"/>
Start / Stop	<input type="checkbox"/> Digital I/O <input type="checkbox"/> System 600 <input type="checkbox"/> Other	<input type="checkbox"/> Digital I/O <input type="checkbox"/> System 600 <input type="checkbox"/> Other	<input type="checkbox"/>
Reference	<input type="checkbox"/> Analog I/O <input type="checkbox"/> System 600 <input type="checkbox"/> Other	<input type="checkbox"/> Analog I/O <input type="checkbox"/> System 600 <input type="checkbox"/> Other	<input type="checkbox"/>
Mode select (Hand/Auto)	<input type="checkbox"/> Digital I/O <input type="checkbox"/> System 600 <input type="checkbox"/> Other		<input type="checkbox"/>
Panel Lock	<input type="checkbox"/> System 600 <input type="checkbox"/> Other		<input type="checkbox"/>
Run Enable	<input type="checkbox"/> Digital I/O <input type="checkbox"/> System 600 <input type="checkbox"/> Other		<input type="checkbox"/>
Fault Reset	<input type="checkbox"/> Digital I/O <input type="checkbox"/> System 600 <input type="checkbox"/> Other		<input type="checkbox"/>
Control	<input type="checkbox"/> Speed	<input type="checkbox"/> %-Reference <input type="checkbox"/> PI Control	<input type="checkbox"/>

Some of the settings are common for both Reference 1 and Reference 2 control modes of ABB drive.

*Appendix C – Installation Check-list*

## Appendix D – Ambient Conditions

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### **Ambient Conditions, Operation**

Ambient operating conditions refer to the conditions the option module is subjected to when installed for stationary use.

**Air Temperature:** 0 to +50 °C

**Relative Humidity:** 5 to 95 %, no condensation allowed. Maximum allowed relative humidity is 60 % in the presence of corrosive gases.

**Contamination Levels:**

Chemical gases: IEC 721-3-3, Class 3C2

Solid particles: IEC 721-3-3, Class 3S2

**Installation Site Altitude:** 0 to 2000 m. If installation site is above 2000 m, contact local ABB representative.

**Vibration:** Max 0.3 mm (2 to 9 Hz), max 1 m/s<sup>2</sup> (9 to 200 Hz) sinusoidal (IEC 68-2-6)

**Shock:** Max 70 m/s<sup>2</sup>, 22 ms (IEC 68-2-27)

### **Ambient Conditions, Storage**

Ambient storage conditions refer to the conditions the option module is subjected to during storage in the protective package.

**Temperature:** -40 to +70 °C.

**Relative Humidity:** Less than 95 %, no condensation allowed

**Atmospheric Pressure:** 70 to 106 kPa

**Vibration:** Max 0.3 mm (2 to 9 Hz), max 1 m/s<sup>2</sup> (9 to 200 Hz) sinusoidal (IEC 68-2-6)

**Shock:** Max 100 m/s<sup>2</sup>, 11 ms (IEC 68-2-27)

### **Ambient Conditions, Transportation**

Ambient transportation conditions refer to the conditions the option module is subjected to during transportation in the protective package.

**Temperature:** -40 to +70 °C

**Relative Humidity:** Less than 95 %, no condensation allowed.

**Atmospheric Pressure:** 60 to 106 kPa

**Vibration:** Max 3.5 mm (2 to 9 Hz), max 15 m/s<sup>2</sup> (9 to 200 Hz) sinusoidal (IEC 68-2-6)

**Shock:** Max 100 m/s<sup>2</sup>, 11 ms (IEC 68-2-27)

**Bump:** Max 300 m/s<sup>2</sup>, 6 ms (IEC 68-2-29)

**Free Fall:** 250 mm

*Appendix D – Ambient Conditions*





NFLN-US-04  
3AJA489002B5009 R0101 REV B  
EFFECTIVE: 8/1/99  
SUPERSEDES: 2/15/99

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